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AN OFFICIAL QUARTERLY JOURNAL OF INFORMATION FOR THE PUBLIC, CONTAINING THE RECORDS OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

Vol. V. JUNE, 1895 No. 2

RECORDS OF

April Quarterly Meeting 1895

SUBJECTS: Sewage Filtration and Municipal Sanitation; Purification of Garbage Polluted Water by Sand Filtration; Chemical Purification of Sewage Water; Disposal of Household Garbage.

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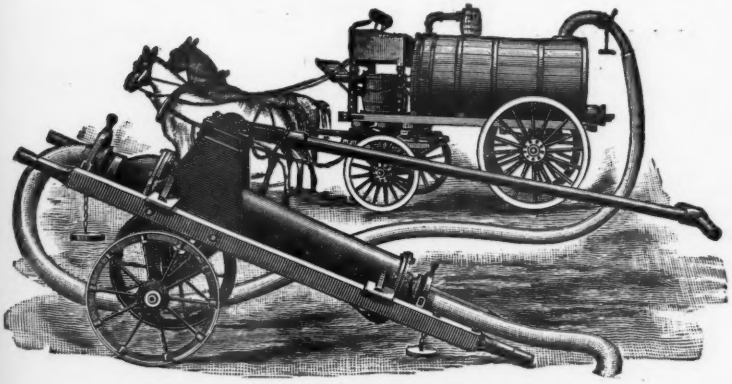

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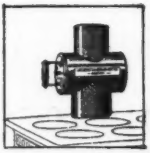

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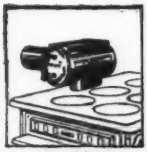

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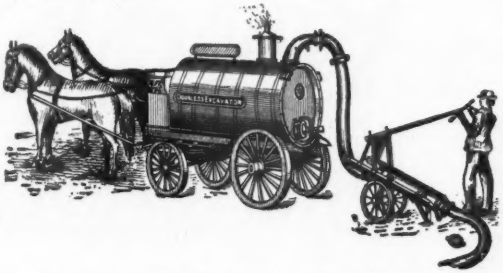

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JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

RECORDS OF

April Quarterly Meeting
1895

SUBJECTS: Sewage Filtration and Municipal Sanitation; Purification of Garbage-polluted Waters by Sand Filtration; Chemical Purification of Sewage Water; Disposal of Household Garbage.

THE JOURNAL OF THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston in March, 1890, with the following objects: the advancement of sanitary science in the Commonwealth of Massachusetts; the promotion of better organization and co-operation in the local Boards of Health; the uniform enforcement of sanitary laws and regulations; and the establishment of pleasant social relations among the members of the Association.

All persons holding appointments as members of a Board of Health in a Massachusetts city or town, the executive officers of such a local board, and the members of the State Board of Health are eligible to membership. Other persons may be elected members by vote of the Association. The annual dues are three dollars.

The Association holds four regular meetings each year, the annual or January meeting always being held in Boston.

THE OFFICIAL JOURNAL OF THE ASSOCIATION is a quarterly publication, containing the papers read at the meetings, together with verbatim reports of the discussions following them. No part of this matter is printed in any other periodical.

The JOURNAL will present, from quarter to quarter, a fair and adequate picture of the progress of practical sanitary science as applied to the needs of a modern community. The various subjects which are reviewed in the quarterly meetings of the Association are treated by experts qualified to speak from daily experience in Public Health offices, who, as men of science, are careful to be scientific and comprehensive, and who, as public officers, are no less careful to speak pertinently and so as to be easily intelligible to the layman.

The JOURNAL, in a word, appeals to all whose interests touch the questions of sanitation and hygiene,— to the architect, the school-committee-man, the manufacturer, the contractor, and, above all, to the busy practitioner who has no time for any reading but what is brief and to the point.

The subscription price of the JOURNAL is one dollar a year, payable in advance. Single numbers, twenty-five cents. It is on sale at the Old Corner Bookstore, Boston.

All communications to the Association should be addressed to the Secretary, Edwin Farnham, M.D., City Hall, Cambridge, Mass.

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MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

Organized 1890.

[This Association as a body is not responsible for statements or opinions of any of its members.]

VOL. V. June, 1895. NO. 2

APRIL QUARTERLY MEETING

OF THE

Massachusetts Association of Boards of Health.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at Brockton on Thursday, April 25, 1895. In the morning the members visited the Pumping Station and Filtering Beds of the Brockton Sewerage Works. In the absence of the President, Dr. Samuel H. Durgin, Vice-President, occupied the chair, and at the close of the dinner, at the Hotel Belmont, called the meeting to order at a few minutes before four o'clock, and introduced the Mayor of Brockton, as follows: —

We are favored this afternoon with the presence of the chief executive officer of the city in which we meet. I take pleasure in presenting to you his Honor Mayor Whipple, of Brockton.

ADDRESS OF MAYOR WHIPPLE.

Mr. President and Gentlemen,— It certainly affords me a great deal of pleasure to extend to you in behalf of the city of Brockton a most cordial welcome on this occasion. In the limited time which has been allotted to us we have endeavored to show you the system of sewerage adopted by our city, one which we believe compares favorably with that of any other inland city of the Commonwealth; and I cannot at this time fail to speak in the highest terms of the ability and energy with which our work has

been carried forward to completion under the direction of City Engineer Snow. The financial and business management from the conception of the work to the present time has been ably conducted by the Board of Sewerage Commissioners; and now it seems to me that all that remains is the co-operation of the local Board of Health in compelling those abuttors along the line of the sewer to connect with the same, and we have ample assurance from them that we shall have their co-operation in this matter.

Now, Mr. President, Brockton is emphatically a shoe town. Without wishing to be too boastful, I will mention the fact that we produce more shoes than any other city in the world. I am aware that that statement sounds large; but during the past year our output was more than $22,000,000 in value, or, in other words, one-fifth of the entire production of shoes in the United States. Now, Brockton is always ready to lead, but never willing to follow. We believe that we have a sewerage system inaugurated here which will lead in the Commonwealth, to say the least. At all events, I hope so. And now I assure you, Mr. President and gentlemen, that the local Board of Health, the Sewerage Commissioners, and the Engineer fully appreciate your attendance here to-day; and again I bid you welcome.

The Chairman then called upon the Secretary to read the records of the last meeting, which were accordingly read; and the Chairman said that, if there was no objection, the records would stand approved. Dr. Ripley suggested that the name of Mr. Cary, of Brockton, be substituted for that of Mr. Lampear; and the suggestion was accepted by the Secretary.

THE CHAIRMAN.— The Executive Committee have the following names of gentlemen to report as candidates for admission as members of the Association: —

T. J. GARRIGAN, M.D., North Brookfield.
E. R. COGSWELL, M.D., Cambridge.
H. P. JAQUES, M.D., Milton.
C. MINOT WELD, Milton.
THOMAS N. PERKINS, Milton.
CHARLES A. HICKS, M.D., Fall River.
M. A. CUMMINGS, M.D., Fall River.
L. P. DEGRANDPRE, M.D., Fall River.
THOMAS JORDAN, Boston.
JAMES E. SEAVER, Taunton.
C. E. LOVELL, M.D., Whitman.
N. K. NOYES, M.D., Duxbury.

What is the pleasure of the Association?

PROFESSOR SEDGWICK.— I move that the Secretary be empowered to cast a ballot for these gentlemen as members of this Association.

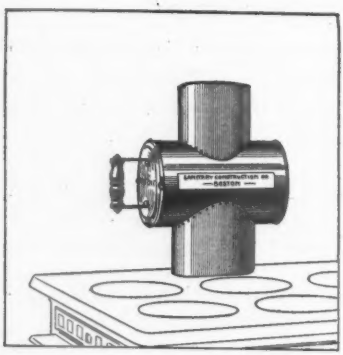
The motion was seconded and carried, and the Secretary cast the ballot accordingly; and the gentlemen were declared elected members.

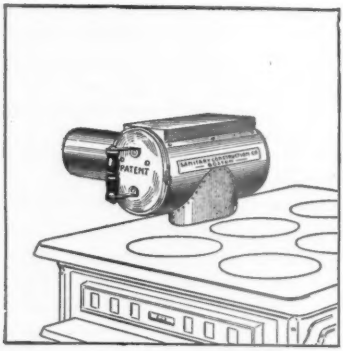
THE CHAIRMAN.— Is there anything to be offered as incidental business? If not, I will take this time to show you a diagram of a device which has been invented by a Boston party for taking care of household garbage in the kitchen.

Until a very recent date all discussion upon the subject of garbage disposal by sanitary associations and municipal governments has been directed solely upon the selection of some one of the many expensive public methods, none of which can be brought into use until after the garbage has been endured upon the premises for a time as a nuisance, collected at public expense, and has become intolerable. The selected methods have been a dumping at sea with the defilement of the harbor and the beaches, a haul inland for burial or to the public cremator or digester, each of which is attended with large additional public expense and more or less public nuisance. These methods of dealing with garbage cannot be called preventive medicine, but rather curative, with the physician called at a very late stage of the disease. We have here represented a single device which deals with all kitchen wastes successfully, with less care and trouble than with the bucket in the yard, and with no odor or objectionable feature whatever. It is a sheet-iron basket with perforated sides, a capacity of three or four quarts, and is to be inserted into a moderate expansion of the funnel just above the stove. It does not interfere with the draft or any use of the stove, and may be emptied only every morning.

The garbage is dried to a charcoal by the waste heat in the stove pipe, and is used as fuel to kindle the morning fire. This method is clean, convenient, inexpensive, and within the reach of all classes. It is what we may call "preventive medicine" in the truest sense, and is worthy of our best attention. The proprietors of this apparatus are Boston parties; and they have kindly sent this diagram at my request, and also a few blue prints which you can take along with you.

If there are no reports of committees to be offered, I will say one word for the Committee on Legislation. There has been during the past year very little call upon the legislative committee at the State House. In one instance only has a question affecting public health arisen in which the committee has taken an active part, and that was on the attempted interference with our plumbing law. Your committee, consisting of Judge Smith, Mr. Coffey, and myself, went before the Committee on Public Health, and

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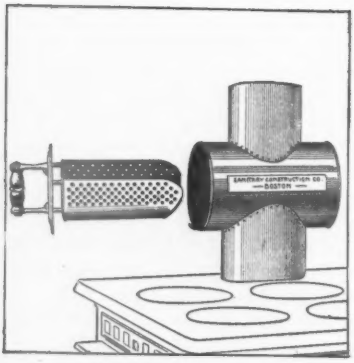

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Into the Sea.

Boston and the North Metropolitan district,—18 cities and towns.
Winthrop.
Revere.
Lynn.
Gloucester.
Nahant.
Quincy.
Beverly.
Fairhaven.
New Bedford.
Fall River.

Chemical Treatment.

Worcester.
Mystic Sewage at Winchester.

Settling Tanks.

State Almshouse, Amherst.
Taunton Lunatic Hospital.
Northampton Lunatic Hospital.

did what it could to save the law from unfriendly amendments. I was told by Judge Smith this morning that the Senate yesterday rejected the new bill which was intended to destroy the existing law by a vote of sixteen to eleven.

The first paper in order is upon Sewage Filtration and Municipal Sanitation, by F. Herbert Snow, of Brockton.

SEWAGE FILTRATION AND MUNICIPAL SANITATION.

BY F. HERBERT SNOW, C.E.

Mr. President and Gentlemen,— If civilized man is not stronger and healthier in the future than he has been in the past, it will not be the fault of sanitary science.

Sanitation has demonstrated that disease is a penalty, and that the cause of disease can be largely avoided. Diseases which once decimated populations by thousands, now, thanks to sanitary science, reap their harvest of death by hundreds only. The cause and nature of disease and the conditions which will reduce sickness to the minimum are better understood than ever before; and recent scientific discoveries are stimulating research and inquiry which should result in still greater benefits to individuals, communities, and nations.

The knowledge of bacteriology and its relations to disease has opened up a wide field for preventive remedies. There is acknowledged authority for the statement that about twenty-five per cent. of all mortality is caused by preventable diseases. This being true, the death-rate of communities can be reduced, and the average duration of life extended in health and usefulness, and the condition of living vastly improved, if the knowledge of preventive medicine can be put to practical public use. Here is where the difficulty lies. The people even of this enlightened period are not ready to receive this doctrine.

Now, a system of sewerage comprising a proper method of sewage disposal is one of the most important of preventive measures; and yet it is seldom that the people want or will allow such works to be properly designed, constructed, and maintained if they can prevent it. Pride of opinion, petty jealousies, and personal pique interfere to a lamentable degree.

The system of sewage disposal by downward intermittent filtration, which you have inspected to-day, is eminently a sanitary measure; but it has few friends and many enemies, some of whom would be glad to witness its failure at any cost. It was adopted by the City Council as a last resort. Even its designer and builder at first favored another scheme.

The town of Brockton had suddenly grown from a country village to a manufacturing city of thirty thousand population. Conditions of living, which were formerly allowed as healthful, could not longer be permitted without jeopardizing the health of its people. Sewers were demanded; but what should be the method of disposal? Any method which would not hinder, but facilitate, nature's method of disinfection might be adopted.

It was found that, whatever the method of treatment of sewage, its purification, or oxidation, is obtained by one mode; namely, chemical action. Sometimes this purification is attained by disposing of crude sewage into some stream of sufficient volume to thoroughly diffuse and oxidize the impurities; and then, again, only the effluent from a chemical precipitation plant can be safely turned into a stream.

The Sewerage Commissioners began to investigate. The Taunton River watershed was studied, and the equal rights of all towns therein to turn crude sewage into the streams taken into account. The significance of the experience of neighboring cities, and the probable attitude of the city of Taunton, made plain the fact that only clarified sewage could be turned into the river above or below Taunton.

In laboratory work not over two-thirds of the nitrogenous organic matter is removed from the sewage. In practice, only a small part of this organic matter in solution is removed, so that, while the effluent from the chemical plant may not have an objectionable appearance, it is, in reality, the concentration of the impurities of the sewage, which contain the bacteria, or disease-producing germs. It did not require any great stretch of the imagination to conceive of circumstances attending an outbreak of epidemic disease in the city of Taunton, being directly or indirectly attributable to the use of the river as a carrier of infectious germs from such a plant up stream; and it was decided that Brockton could not maintain, with any assurance of permanency, a plant for the chemical treatment of sewage, with the intention of delivering the effluent into the river above Taunton.

Attention was then directed to tide-water disposal into Jones River, North River, and Weymouth Fore River. A place was found at Pier Head, at the entrance to Plymouth Harbor, where crude sewage disposal would not be objectionable. The nearest point at which sewage could be turned into North River, and avoid conditions adverse to complete removal to the ocean, such as flood-tide, shallow water on marshes and flats, head winds, a crooked channel, and eddies in the current, was found off Truant's Island; but even here such disposal would not be practicable without first restoring the river to its original condition of tide and current. The objections to disposal into Weymouth Fore River or a connection with the Boston Main Drainage Works at Squantum were so great as to render the scheme positively impracticable.

The estimated cost of reaching tide-water at Taunton River, Plymouth Harbor, or North River, exceeded a million dollars; and hence it was thought that Brockton and adjoining towns might derive a mutual benefit by joining in a general scheme. When, however, after an original study of the local problems of eleven towns, it was found that, with a reasonable outlay, there were places where sewage could be discharged or disposed of by some treatment without causing a nuisance, and at an expense very considerably less than the cost of a connection with a metropolitan scheme, it became evident that Brockton and vicinity had not reached the size and financial ability to grapple successfully with the problem of disposal into tide-water.

There being no stream or tide-water available, land treatment only remained to be adopted; and it was found that, of all the areas in or out of the city, the old musterfield, or present location of the filter-beds, was the most feasible.

Now, the term "filter-beds" is a misnomer so far as it relates to the manner of purification of sewage. The popular idea is that intermittent filtration is a mechanical straining, and hence the people's opposition to the method. Common sense asserts that it is only a question of time when a filter will become clogged with accumulated strainings. This is all right, so far as it goes; but the public do not know that it is with the purification of the organic compounds in *solution* that we are chiefly concerned, and that the matters in suspension, which can be seen and sometimes smelled, are the least harmful and easiest to get rid of. The suspended matters do gradually fill up the surface pores of a filter, and make necessary the replenishing of the material at certain intervals. If this can be done without offensiveness to the senses of the people, they care nothing whatever about the poisonous germs in solution or what becomes of the liquid filth.

Through the action of the air and bacteria, putrefying matter sooner or later reaches a harmless inorganic form. A filter-bed merely introduces conditions favorable to the aiding and quickening of this action. When sewage is poured upon the surface of a filter-bed, it is carried down by gravity, separated into small particles by the dividing quality of the sand, and brought into intimate contact with a large supply of oxygen. Just as ice chopped up will melt faster than in a cake from the increased surface presented to the heat, so the films of sewage hanging on the grains and stretching between the particles of sand will be more rapidly oxidized and purified. As the lungs are continually inhaling a new supply of oxygen for the purification of the blood, so likewise must a filter-bed, to be efficient and enduring, have a regular respirating action. This is the principal of intermittent filtration. It is a chemical action. The necessity of a supply of oxygen is absolute.

The proper relation of air and sewage varies in different sands. Sewage is liable to pass through coarse sand before the process of purification is complete. Lack of sufficient air forms the chief difficulty in fine sand. For each sand there is a size of dose and interval of time between doses, which will give the best results. To find the economical dose is to attain the economical management of the filtration plant.

The success of filtration of sewage depends wholly upon intelligent management. Speaking generally, the people who pay the bills and the councils who appropriate the money do not readily comprehend the vital importance of this fact. They are liable through ignorance or prejudice or stupidity to handicap a department and prevent the proper maintenance of a sanitary measure.

As a good illustration of the popular opinion of filtration of sewage, allow me to give this instance: A gentleman, a former member of the city government, stopped me on the street the other day, and said, "I think the Board of Aldermen had better go slow in making an appropriation for the extension of sewers." "Why?" I asked. "Because," he replied, "the residents in the vicinity of Marshall's Corner complain that the proximity of the filter-beds is a nuisance and a menace to the health of the neighborhood, and that their property is depreciating in value; and I am of the opinion that they may yet oblige us to abandon the entire disposal plant or purchase their property."

It is strange, but true, that, while people inhale no less harmless odors from a newly fertilized lawn without inconvenience, the mere suggestiveness of the term "filter-bed" carries with it repugnant odors. No amount of reasoning will convince such people that treatment of sewage upon land is the safest and most natural way, and that no possible harm can come from it if it is properly handled.

It is surprising to note the general opposition to not only the filter-beds, but the entire sewerage system. Appropriations for the rapid extension of sewers into residential districts are opposed because owners of individual estates and of tenement houses do not want to sustain the additional expense. Some say that because the cesspool never has to be cleaned out their property is not in need of sewers. Others point to the low death-rate as an argument that too much money should not be spent in extending sewers where they are not called for. The whole question is weighed in the balance of popular sentiment. On one side are put the present low death-rate, and the abundance of porous, sandy soil, and the successful disappearance of house drainage in sandy-bottomed cesspools, and all that can be said to show that sewers are not a necessity; on the other scale, the slight objections to cesspool and privy vaults, the general desirability of sewers, and the employment such works afford to the laborer, and all that

can be said in favor of sewers, are put. And the two may about balance. The money weight is then put on, and down goes the first scale with a bang.

Five years ago there were 3,386 privies and 2,743 cesspools in this city, many of them in close proximity to wells and bedroom windows; and to-day there are many more. These places of indecence hold accumulations of the worst kind of decomposed filth, which inevitably permeates the air of cellars, houses, and yards with poisonous gases, and in sandy or porous localities saturates the soil with liquid pollution, there to remain in an active state of putrefaction, a veritable underground "sea of death." And yet the question, "Is the cesspool a nuisance, and shall it and the privy vault be abolished?" is being argued in this city to-day.

Sanitarians have demonstrated that the definite and remediable cause of particular outbreaks of disease has been the cesspool; and yet the public do not demand and municipal officials do not hasten to remove the cause, without questioning the advisability of the expense. If they accept in a broad way the fact that certain engineering works always diminish the amount of sickness and death, attempts to demonstrate to them the necessary connection in any particular case between sickness and the cesspool usually prove a failure.

Erroneous notions of sanitary laws are held because their observance would require a few dollars' expenditure. Frightful visions of the poor-house are conjured up before its opponents, producing a spasmodic contraction of the pocket-book, and driving them further from the divine doctrine of sanitation.

These oppositionists do not want to be told that sanitary reforms are of vital importance to public health. They oppose the abolition of cesspools, privy vaults, and domestic wells, and the introduction of sewerage and underground drainage and public water supply; and they object to public inspection of house plumbing or anything else which pertains to their own welfare. They oppose any movement which would interfere with their unsanitary notions of individual freedom or increase the municipal taxation of private property. They are indifferent or blind to everything but their own selfish interests. They will see nothing but objections to any movement which is broad and liberal and caters largely to the masses. Some are more than willing, they are anxious, perhaps, to enjoy the advantages of sanitary measures, and they are abundantly able to bear the expense; but they strenuously object if they imagine they are to be called upon to pay for more than they can personally enjoy.

They say that in those districts where death-rates are greatest the ignorant, idle, and vicious, the intemperate and incapacitated, will be found, whose unsanitary habitations are adapted to their tastes and customs, and

out of whose inherited ancestral degeneration and starved brain condition they will not be elevated. Money expended in such communities for sanitary purposes they claim is worse than wasted. But they forget that among this kind there is a distinct class of honest poor people, who industriously struggle for themselves and their children, in the hope that fate may not always be against them, and who appreciate assistance and are truly worthy of it, and that the more fortunate classes cannot be assured of immunity from disease which emanates from such unhealthful localities.

It is because teeming masses of humanity find in the close areas and life of cities and towns little to encourage the observance, but much to promote a disregard of the laws of their physical well-being, that sickness, like an evil spirit, pervades the atmosphere, and hospitals, asylums, and almshouses are populated with objects of public and private charity.

By all the laws of society and civil government, every town and municipal corporation is morally and physically bound to furnish to its population pure water, the purest air possible, and a well-drained soil. Later on, when people more universally know the truth, any other than sanitary conditions may be considered as criminal negligence, and good and sufficient cause for claims for damages, just as now suits are brought to recover damages sustained by individuals who, through faulty conditions of the highway, have been injured in person or property.

One of the important questions of the hour is, What shall be the relation of sanitation to city government? Politics, the bane of sanitary progress, will not permit a comprehensive consideration of the subject. Increased taxation for sanitary measures affords a most favorable opportunity for the party out of power to charge the party in power with reckless extravagance and public robbery. Permanent sanitary works, designed and constructed for future requirements, are always costly, and hence the temporary and wicked policy pursued in most American cities, to the sacrifice of human life and to the shame of our boasted civilization. Ignorance, selfishness, and avarice prevail at the expense of the health and liberty of the people. Because air and water are free, individuals are allowed to pollute and contaminate them at will, so that the glorious rights of the American citizen be not imposed upon. Such liberty is death. It is not the freedom which our forefathers heroically labored to establish, not the government of the people, for the people, and by the people, which true democracy demands.

Without proper sewerage, drainage, street cleaning, garbage and refuse disposal, and an abundant supply of pure water, no amount of individual hygiene can garrison a city against an invasion of epidemic.

A sewerage system cannot prevent sickness, even when it is so designed and maintained, and sufficient authority over the house connection and plumbing is had to afford the people a reasonable assurance against con-

tagion or the influence of preventable diseases, so far as they may be attributable to sewerage. But, if systematic supervision over the flushing and ventilation of sewers is not constantly had, they inevitably become foul, elongated cesspools, and breathe noxious gases through faulty plumbing to the inmates of buildings.

Doctors have found this to be almost an invariable cause of certain kinds of fever, and nine-tenths of the cases of diphtheria reported in certain places have been attributed to sewer gas. Thousands of the brightest and best of the race had to perish, victims of sewer gas, before it became apparent to certain authorities that municipalities must have positive control of a sewerage system from the top of the house to the end of the sewer.

Intelligent oversight that understands the design of a system of sewerage and of sewage disposal, and fully comprehends the difficulties of its sanitary maintenance, is absolutely necessary to prevent conditions favorable to the rise of zymotic diseases; and yet the health official, who enforces uniformity in sanitary observations, is sure to arouse and draw down upon himself the personal enmity of a class who think themselves better informed of sanitary requirements, and who not only speak in pronounced terms against systematic sanitary reform, but bitterly oppose the continuance in office of its advocates and supporters. This class believe that it is a safe measure to renovate their neighbors' premises, but the least intimation that their own property should come under sanitary supervision is received as a slanderous insult which their pride never forgives.

Politics ought not to enter into such offices. Possibly there are men, progressive, broad-minded, and whole-souled, that can interest, convince, and enthuse certain fault-finders and doubting Thomases, and laugh at the difficult obstructions others may place in the way of reform, who thereby have qualities which fit them for positions of public importance, and who, for honor or love, would be willing to fearlessly discharge the duties of a health official in accordance with the best sanitary knowledge of the day, even at the sacrifice of their professional, social, or business prospects, and their serenity of mind and faith in mankind, and all this in order to secure the observance of sanitary rules and regulations for the *brief* term of their service. But their name is not legion, and their numbers will not be increased until there is a positive assurance that the good work which must cost so much personal effort and sacrifice will be continued beyond their connection with the reform.

To these difficulties may be attributed the slow progress of certain sanitary reforms; and I say that the cause is almost hopeless so long as officials must, unprotected by tenure of office, cope with political and social powers.

Legislation is being continually directed toward the prevention of

disease and death. Able minds have urged and secured the passage of sanitary laws which have accomplished much good, and yet the value of law is in its enforcement. The people keep on in the same customary way of thinking and living and acting, committing sanitary indiscretions which largely escape public notice, and which effectually prevent them from discriminating between the truth and error. To their habits and customs of thought they will cling with the utmost tenacity, until driven to forsake them. Getting everybody educated up to public hygiene is all well enough; but compulsory hygiene will accomplish the desired results. People cannot be forced to believe, but they can be forced to obey until they believe. When the prevalence of disease threatens life and health, certain habits are given up, and health rules are carefully observed. When the danger is past, the people are as careless as ever. A popular presentation of the subject may momentarily appeal to the common sense of every intelligent person, but it is soon forgotten. There are natural causes for this lack of interest in the subject. Each individual takes care of himself, and avoids those who would contaminate him. He is too busy to look out for others. Human selfishness is the ruling motive; and so long as this is true, and people aggregate in communities, the prolongation of life in preserved health will be a public duty.

The contemplation of the possibilities of sanitation for the masses when people comprehend the truth and are converted from the error of their ways is very pleasant. It is very pleasant to think that a universal recognition and faith in the laws of sanitation would diminish the cause and hence the occurrence of disease; but how many you can find in any community who realize the value of the observance of such laws only when they are made to through fear and trembling,— during the fearful ravages of some dreadful epidemic! The people may be momentarily elevated to catch a glimpse of the brightness of the coming sanitary era, but it seems to be only a vision of the other world, where sickness and sorrow, pain and death, cannot enter; and so they fall back into the old way of living.

Such people need to be led. They need to be governed by laws which they are forced to observe until they see for themselves and willingly heed the will of nature.

Because the public are sceptical concerning almost any proposed remedy for disease, and popular ignorance and indifference have an inertia which can be overcome only by the most constant and persistent efforts, is our responsibility in the least diminished? Is it not rather increased? With the means at hand for the study and observation of such questions, it becomes our duty to take the initiative steps. The intelligent public expect those who are acting in an official capacity, to keep thoroughly informed.

They expect that proper authorities will enact proper laws and city ordinances and health regulations for the protection of their homes and their children from the ravages of contagious diseases. They do not know so much about preventing disease. If they did, legislators would not allow that dread but silent and secret disease, consumption, which is the cause of fully fifteen per cent. of all the deaths in this country, and from whose visitations no climates have positive exemption, to constantly slay its victims, unmolested by active legislative measures of repression and prevention, while the more local, sudden, and intense, but less deadly cholera, fevers, and small-pox, are combated by rigid municipal, State, and national quarantine regulations. If the people realized as we realize that the atmosphere is a great medium for the transmission of disease, that suspended particles of refuse dust, animal matter, bacteria, and micro-organisms, and gaseous and vaporous impurities are constantly present to a greater or less extent, and that the accumulation of these foreign substances in the atmosphere is a detriment to the health of mankind, then persons whose systems have been weakened and perceptions blunted by habitual breathing of vitiated air, when told that their symptoms, characteristic of specific maladies, are caused by atmospheric impurity, would not be so slow to believe and to change their condition. There are thousands of this class to-day who cannot change their surroundings or vocation, and their consequent proneness to disease is, I claim, in a measure chargeable to the government; and an officer, local or general, in the possession of the knowledge that the prevalence of a low state of vitality is due to remedial causes, who does not take active measures to prevent the violation of nature's laws, must expect from Almighty God the just recompense of his reward.

I sincerely believe this, but I would offer an apology for past officials. It is said that "the time of their ignorance God winked at, but now he calleth all men to repentance." Man's thoughts and actions are quite liable to be like the thoughts and actions of the world around him; and hence it is not strange, since the characteristic American man solves all problems on the basis of the dollar, that the health official is inclined to carry no greater weight of responsibility than the economical enforcement of existing laws. The primary object of the law is too many times overlooked, and profit and convenience allowed to control. It does not do for Boards of Health to drive the square-wheeled sanitary cart too fast,— they can't stand the bumps.

Now, while much may be accomplished by legal processes and while law and its rigid enforcement is of first importance, yet sanitary interests are not the only interests of a community, and, until popular education removes popular prejudice, the enforcement of sanitary regulations beyond the extent to which it is carried to-day will be considered as an interference with

personal liberty. A high standard of public health cannot be maintained until the sympathies of the people are enlisted. They must be first taught the importance of personal hygiene, and then they can see clearly the importance of public hygiene.

The cause of education would be aided and abetted if certain influential persons always to be found in any community, who believe that preventive remedies on a large scale cannot be practically applied, could be shown the value of human life. Such men stigmatize health measures as unnecessary obligations and burdensome extravagances, and their talk prevails upon conservative members of legislative bodies to vote down or cut appropriations. Their belief that indolent and low-born people are not worth saving, and that their fate is pestilence, famine, and war, belongs to the age of tyranny and superstition. It belongs to the depraved and the assassin, the cannibal and the barbarian, who place but little value on human life, and not to prudent and industrious parents and to intellectual and ambitious people.

Yes, human life is worth living and saving; and its value will increase with the advancement of civilization. Sanitary progress may be slow and its course tortuous, depending upon who is at the helm; but it is as sure as sure can be.

Then let public interest and thought be aroused and directed in proper channels. Let the people be shown that youth, inexperience, and indiscretion are the faults of our country. Let them be shown that experience has taught foreign countries the necessity for their preservation of the enactment and enforcement of rigid sanitary laws, and that in this respect the best conducted cities in free America suffer in comparison with some of the European monarchical governments.

Let them be told that France has one doctor to every 3,000 inhabitants, Germany one to every 1,500, and the United States has one to every 600 inhabitants; that France graduates 600 medical students every year, Germany 900, and the United States graduates nearly 4,000 students every year.

Let them be asked, since one ounce of prevention is worth sixteen ounces of cure, why 6,666 doctors, laboring to prevent disease, would not accomplish as much as the 100,000 doctors who are trying in this country to cure disease. Would it not be vastly better for the government to constantly employ the remaining 93,334 doctors in reducing and preventing sickness and death, and thereby removing many heavy burdens from the people, rather than to pay out the enormous sums which are now expended for the support of almshouses, hospitals, asylums, jails, and prisons? Would it not be an example of practical economy?

Tell them that an abundant supply of pure air to shops and buildings

during working hours would accomplish much toward diminishing disease, that sanitation demands the proper ventilation of all buildings, and, to accomplish this, perfect sewerage and drainage are absolutely necessary.

Tell them that eight hours should constitute a day's labor, since man's body is a machine whose parts were intended to wear out together. But wearisome and unequal hours of labor and the privations of poverty cause some parts to break down while other parts are strong; and the man sickens and dies, or draws out a long existence of pain and wretchedness. So sanitation would aid labor, and laborers would do well to render hearty support to sanitary science.

Tell them that eight hours only of labor is more a necessity for shop hands, clerks, and most all indoor and sedentary occupations than for out-of-door work. Take, for instance, the brain worker, who has added to mental labor great responsibility and its weight of anxiety. This extra load has to be borne by the heart, which already has its full quota of work to perform; and, if the extra strain upon the system is borne incessantly for long hours, it will oppress the heart, weary the muscles, irritate the nerves, and, if shorter hours of labor are not observed, will possibly result in sudden death.

And, when the people have been enlightened, then will they accept with eagerness the gospel of sanitation and hygiene, and cheerfully obey the laws of life as revealed in nature. But before this day comes many must be taught by sad experiences to desire truth and rightness of living, and many who would change their surroundings must be kept from the full enjoyment of sanitary blessings by the scepticism, habits, and slothfulness of the masses.

So, then, proper and sanitary laws are of the first and greatest importance; and, in order that they should be the best and most effective that can be devised, they should emanate from the State. Sanitary laws should be State laws, and sanitary officials State officials, thus avoiding certain evils of municipal administration, and the securing of competent officers. The State Board of Health should have a grand advisory and supervising power, the local Boards of Health be filled with men especially adapted and fitted and interested in the work of sanitation, and the maintenance of certain public works should be brought more directly under their control.

Legislation should be had upon all those subjects which affect public health. Sanitation urges the enactment of laws relating to the ventilation of dwellings, workshops, buildings, drains, sewers, yards, streets, etc.; of laws relating to the width of streets, air space between buildings, topographical regulations for physical growth of towns and cities, and open spaces and public parks for the constant renewal of pure air. Laws should be passed for the regulation and protection of people wherever they may

congregate. Sewerage and drainage systems should be compulsory. General immigration should be taken in hand. Incentives to active sanitary endeavor, in the way of liberal compensation for services, should be offered. Executive officers should be well qualified, and free from political usurpation. Architects and builders should be required to submit specifications to the proper authorities. The liberal use of public water should be compulsory. Abatement of rentals could be made, if necessary, so that no person would be impoverished by the abundant use of that which is essential to cleanliness and even to life itself. Public baths should be established, and compulsory washing be enforced, until a love for so healthful an exercise became prevalent.

And now, in closing, allow me to express my appreciation of the honor of addressing so distinguished a body of gentlemen, the importance of whose mission should be secondary to none, and upon whose watchfulness and fidelity, judgment and integrity, as guardians of the public health, depend the temporal comfort and happiness, and to a certain degree the moral and intellectual destiny, of the masses.

In your battle against public stupidity and scepticism may you receive the support of universities and institutions of learning! Through your efforts may statesmen become as much concerned in the preservation of public health as in the extermination of bugs and insects! May the people become as much alive to what affects their health as to what affects their pocket-books! May men be as anxious about their own and their neighbors' health as they are to prevent disease among hogs, cattle, and horses! And may you live to see facts which are now ignored become gladly accepted, plans which are now frustrated by lack of public enlightenment carried out by general and cordial co-operation of communities, and the day when the execution of sanitary improvements will be hailed with joy, and its importance universally recognized!

THE CHAIRMAN.— In the absence of Dr. Walcott we shall have to pass the next paper ("List of the Various Systems of Sewerage in Massachusetts," by H. P. Walcott, M.D.).* Inasmuch as the following paper is upon a subject of the same nature as that we have already had, we will postpone discussion until it has been presented: —

*Dr. Walcott has prepared a list giving this information, which will be found on page 33.

PURIFICATION OF SEWAGE-POLLUTED WATERS BY SAND FILTRATION.

BY PROFESSOR W. T. SEDGWICK.

Mr. President and Gentlemen,— I had hoped that the discussion of the interesting paper which has been presented by Mr. Snow would have lasted so long that we should have been obliged to take the train before the time came for me to say anything; but the Chairman has called upon me, and I shall have to do the best I can.

I had hoped that Engineer Snow would give us something more than he has done upon the construction and operation of the plant which he has so admirably carried out, and which we have so much enjoyed visiting to-day. Personally, I am much impressed by it; and it seems to me that the city of Brockton has done an excellent thing in that it has set about the collection and purification of its sewage in the careful, thoughtful, and scientific manner that it has. As any one can see, most of the work is still to come, the actual work of filtering; and in the hands of its skilful and enthusiastic engineer I feel sure it will go on well, especially as it is under the control of an efficient Board of Sewerage Commissioners.

With regard to the Purification of Sewage-polluted Waters I will say only a word or two. The matter may be stated rather briefly, something like this: Why do we attempt to purify sewage-polluted water? For two reasons: first, because such water is a nuisance; and, second, because it is apt to be dangerous to the public health. It certainly is dangerous to drink.

How shall we go to work to purify it? Well, how does nature go to work? If the farmer puts upon his field barn-yard manure year after year, giving it a heavy dressing of the material, this is easily taken care of by the mother earth. No one knows or thinks that the farmer is creating a nuisance, the odor is not objected to by any one. On the contrary, every one of us feels a sort of primitive agricultural delight in the smell of good barn-yard manure thus utilized, and we have no objection to living in the neighborhood. I have seen the lawns on Commonwealth Avenue in Boston so covered with stable manure that one had almost to hold his nose in passing, and yet the same people who do not object to that odor would complain most bitterly of the slightest odor coming from a garbage pail or anything else of equally unsavory nature or origin. We know that the earth takes care of this organic matter. And the same is true of the conditions of the ordinary untidy country house or the tenement house, where

the housewife, to get rid of her dish-water or slops, throws them out of the window. Unless that is done in excess or for too long a time and under unfavorable circumstances, the earth takes care of all the stuff thus thrown out, and little or no trouble ensues. Here is a hint for the doing of the whole thing. The earth is capable of taking care of the organic matter, provided it does not have too much of it or have it for too long a time without change.

We have arrived at this conclusion by experimentation. As long ago as 1839 London began to filter the highly polluted water of the river Thames through sand filters. It was supposed that by simply straining out the suspended matters and some of the dissolved matters the water would do no harm. Bacteria had then not been heard of. But time has gone on, and it has been found by making a study of the affair that, by putting sewage-polluted water on the land, with the right kind of soil, you can dispose of sewage on land as the farmer disposes of his barn-yard manure; or, on the other hand, in the case of sewage-polluted water, that a larger volume of water can be treated, and then recovered through an underdrain, and used for drinking.

As an example of the first case, the city of Berlin, a city of a million and six or seven hundred thousand population, disposes of its sewage upon the land. The river Spree runs through the city, but does not receive the sewage except in times of storms, when the overflow goes into the river. The sewage ordinarily is disposed of upon the land; and the same principle is applied as here in Brockton,— namely, the putting of a thin layer of sewage upon the soil, and letting the earth take care of it. In the case of Berlin they make use of the sewer-impregnated soil to raise crops; but, when you commence to raise crops at the place where the filtering is going on, you must remember that you cease to operate the filter to its highest capacity. In Berlin they raise cabbages and other vegetables, where the sewage of sixteen or seventeen hundred thousand people is disposed of on the land; and the effluent water, as it comes out below, is used for drinking. Here is an instance of the disposition of sewage in this way on a large scale. And if any one says that Brockton's plan is only an experiment, and that no one can say how long it is going to continue satisfactory, or how it will be in fifteen or twenty years from now, we may reply that Berlin has been doing the same thing for years, and there is no uncertainty about it; that the mother earth, when the place is rightly chosen and the operation is properly managed, will take care of any amount of organic matter which you may wish to put upon it.

When you come to water purification, there is the same problem with certain modifications. Sewage is water gone bad, water with excess of foul matters,— such as we saw to-day,— which sewage was not ordinary sew-

age, but thinner, yet for my purpose answers well enough, because I may point to those filter-beds, and show you sewage-polluted water purified there by sand filtration. It was sewage, so called. It was really sewage-polluted water; and that is what sewage always is. The sewage of Berlin is so polluted that it becomes almost as black as ink, and is as thick as thin mud. I have seen it of that character on the filter fields of Berlin, like thin black mud or thick ink. Now in such a case, ordinarily, there is one unfavorable condition: the sewage does not contain any oxygen. These filters are not strainers, they are not mere heaps of sand; but, when in good working order, they are rather like living organisms, for they are filled with bacteria which breathe and feed, taking up the organic matters of the sewage. Oxygen being available, the bacteria resident in the sand feed upon the organic matters, and reduce them to simpler matters of a mineral sort, and their organic character is lost. It is as if those filter-beds were a gigantic living sponge. You know the sponge before it is gathered is a living mass permeated by narrow channels. And, if we imagine one of those filters to be a heap of sand, swarming with living bacteria, we can see how easy it is for the sewage-polluted water to flow into this great sponge, and for the living contents of the latter to feed upon the matters it contains. When the filters are water filters, they work more freely, because ordinary water is saturated with oxygen.

The theory becomes comparatively simple when looking at these filters, if one does not regard them as mere sand, but rather as something which would remind us of London and Paris with their dense populations, great centres teeming with multitudes of individuals. The sewage that arrives they receive with open arms, taking from it the organic matters which are their food, and working them over into mineral matters, which, in solution, pass off below. So the purification of sewage-polluted water is pretty much the same thing as the purification of sewage, only the work is done faster because of the oxygen in the water. You have an example of this in the city of Lawrence, where you have heard of the municipal filter designed by Mr. H. F. Mills, of the State Board of Health. That city is now supplied with water fit for drinking, purified by simple sand filtration in a bed two and a half acres in extent. It is not merely a bed of sand, but contains a vast multitude of bacteria, feeding there upon this impure water, which, after it is filtered, goes into a reservoir pure and clear. We may see how the thing works as far as can be seen with the naked eye, but for scientific purposes we must take a microscope; and we shall then find every grain of sand in this great filter coated with bacterial jelly, and bacteria actively at work doing their part in the process. If we wish to see what has been accomplished in this way, we can compare the death-rate in Lawrence as it is now with the death-rate which prevailed before the filter went into opera-

tion. Lawrence, instead of standing higher than any other city in the Commonwealth in deaths from typhoid fever, as it did, stands now on a par with those cities which are furnished with a good water supply and having similar industries and climate; and its bad reputation as a breeder of typhoid fever has disappeared. Typhoid fever is no longer "endemic" in Lawrence: it is only occasional and sporadic, as it is in Haverhill, Brockton, Lynn, and all other cities with good water supplies. There are a few cases arising from the use of water taken unfiltered from the river, and a few imported cases, and also cases from using bad milk and from other sources; but the death-rate of Lawrence from typhoid fever now compares favorably with that of other cities of its own size, character, and situation having perfect water supplies. In other words, sewage-polluted water that is purified is not objectionable, but safe. The same thing is true of London, which for many years has been supplied with sewage-polluted water thus purified. The death-rate of London from typhoid fever is very low.

In looking at these so-called intermittent filters, then, one should take out of his mind any idea that they are mere heaps of sand. Every grain of that sand has on it thousands of bacteria which have taken up their residence there in a jelly-like form, so that the total effect is softness of the soil, because of this great aggregate of bacterial life. It is bacterial life which takes care of the farmer's manure spread upon the earth, and of the dish-water thrown out of the window by the careless housewife, and of the sewage which is spread on fields, as you have seen it to-day.

THE CHAIRMAN.— We have still another kind of sewage purification in use in this State. Perhaps Professor Kinnicutt, of Worcester, can tell us something of the success of the chemical purification of sewage water at that place.

PROFESSOR L. P. KINNICUTT.— I feel a little out of place in speaking to you at this time on chemical precipitation. To-day we have had the pleasure of seeing a plant for treatment of sewage by intermittent filtration, a plant which has been laid out with great skill and which gives every indication of doing perfect work. As your Chairman has said, however, there is another system of sewage purification used in this State, that of chemical precipitation, which consists of adding certain chemicals to the sewage, causing the precipitation or settling out of all the offensive substances that are suspended in the sewage, and a part of the offensive matters that are in solution.

By this process we do not attempt to change sewage into drinking water,

but to obtain a perfectly clear liquid, which has no disagreeable odor, and is not in any way dangerous to health unless it is used as a drinking supply, and which can be emptied into a running stream without causing any offence.

In Worcester we purify the sewage by this process.

The population of Worcester is about one hundred thousand; and, the sewers being for the most part constructed so as to carry off both the street washings and the sewage proper, the amount of sewage treated each day is twelve million gallons.

In deciding on the best method for the treatment of the sewage, a careful study as to the character of the sewage was made; for, though the process you have seen to-day may work perfectly with certain kinds of sewage, it is very doubtful what would be its action on all kinds of sewage.

It was found that Worcester sewage contained large amounts of free sulphuric acid and of various iron salts; and it was decided that successful purification could be better achieved by chemical precipitation than by intermittent filtration, or, in other words, good results could not be expected by putting such sewage directly upon land.

Chemical precipitation as the means of purification being therefore decided upon, a plant was constructed for this purpose about three-fourths of a mile from Quinsigamond Village, or about three miles from the centre of the city.

The plant consists of an outfall sewer, a mixing house for the chemicals, engine and dynamo house, a chemical laboratory, and sixteen settling basins, the whole costing about two hundred and fifty thousand dollars.

The process used is adding milk of lime and sulphate of iron to the crude sewage. The sewage contains a very large amount of iron sulphate; but, unfortunately, the iron sulphate does not come to the works at all times, and, when it does come, it is largely in excess of the amount necessary to accomplish the work. So at these periods, which are as a rule three times in the twenty-four hours, part of the sewage is stored so as to be used when there is no iron sulphate in the sewage.

The lime is bought in the form of quick lime, and is slaked and mixed with water, in the mixing house, and discharged into the sewage through a pipe about 800 feet above the tanks, so that when the sewage comes to the tanks it is thoroughly mixed with the lime, the amount of lime used being 950 lbs. of quick lime for every million gallons of sewage.

The tanks are sixteen in number, covering 106,656 square feet and having a cubical capacity of about five million gallons.

The sewage as it enters the tanks is very dark-colored and opaque. As it passes from tank to tank, it grows less and less colored, and clearer and clearer, till, when it reaches the last tank, it is as clear and colorless as spring

water, and only has a very slight odor, resembling slaked lime. From the last tank it is carried into the Blackstone River. The sewage as it comes to the works contains 60 parts of solid matter in 100,000 parts of the sewage, 36 parts of which are mineral and 24 parts vegetable and animal matter liable to decomposition.

About one-half of this vegetable and animal matter is suspended, not dissolved in the sewage. The amount of albuminoid ammonia in the sewage is five-tenths of a part in 100,000.

By the process as used in Worcester, practically all of the suspended vegetable and animal matter is removed, and twelve per cent. of the decomposable matters that are in solution. The amount of albuminoid ammonia in the effluent as it leaves the last tank is, on the average, a little less than twenty-five hundredths of a part in 100,000.

When we were honored by a visit from the Association four years ago, the process was in an experimental stage. To-day, if you would honor us with another visit, we could show you what we consider a successful way of treating the sewage of large manufacturing cities.

THE CHAIRMAN.— The papers and remarks are now before you for discussion, and I presume the reader of the first paper and those who have explained these systems will be glad to answer any questions which you may feel like asking.

DR. CHARLES H. COGSWELL.— What is the final disposition of the effluent which comes from the filtering bed in Brockton?

MR. SNOW.— It empties into the Coweeset River, which is a tributary of the Taunton River.

DR. COGSWELL.— What is the flow of the Taunton River?

MR. SNOW.— It has a watershed of about four hundred square miles, which delivers below the city of Taunton in an ordinary summer a flow of about one hundred and twenty cubic feet per second. This flow would sufficiently dilute the sewage from a population of from forty to fifty thousand. The city of Brockton is at the head of the river basin, and over twenty miles up stream north of the city of Taunton, so that, while the volume of water flowing in the streams in wet weather may be quite considerable, yet during the dry months of the year it is practically nothing for purposes of receiving sewage, either crude or clarified.

PROFESSOR SEDGWICK.— How long before the whole of the present disposal plant will be in use?

MR. SNOW.— We have guaranteed to take care of the sewage of twelve thousand people only on the twenty-two beds now prepared. It is probable

that the capacity of the filters will exceed this quantity. At present there are only eighty-five estates connected with the sewers.

PROFESSOR SEDGWICK.— How soon will you be likely to get the quantity of sewage you would like to treat?

MR. SNOW.— I am unable to answer that question. It depends on the rapidity of sewer extensions, and whether or not owners are required to connect their estates with the system. The present indications are that it will be some time before twelve thousand people have their homes or places of business equipped with the facilities for using the sewers. The Sewerage Commissioners recently recommended an appropriation of $250,000 to be expended in extending street sewers this year; but, on account of opposition to the extension of sewers into certain districts, the Board of Aldermen cut the figure down to $175,000. Some of the reasons for the opposition and this action have been previously given in my paper.

DR. F. J. RIPLEY.— Perhaps it will be interesting to the Brockton Board if the gentlemen of other boards would tell us what plan they have adopted in regard to compelling people to make connection with sewers.

HON. E. IRVING SMITH.— Waltham has had more or less experience in that matter. A system of sewers was put in there three years ago, and I think that I may venture a partial reply to the question asked. In 1890 an act was passed by the legislature which authorized boards of health to compel all persons to connect their premises with the public sewer. The practical method adopted by the Board of Health in Waltham was, the first year that the sewer was opened, to send out notices to the abutters, especially in places where the premises were in bad condition, requesting them to appear before the Board, and show any cause they might have why they should not proceed to connect their premises with the sewer. A great many did so appear, and a considerable number showed why they should not be compelled to connect. The reasons commonly given were financial inability or contemplated changes in plumbing which the owners were not yet quite ready to make. A large number of persons were compelled to enter the first year. Besides those who were thus compelled to enter were those who, without appearing before the Board, made voluntary connections with the sewer. The next year — that is, the year of 1894 — was one of financial depression; but still we compelled a good many to enter. We did not adopt the same proceeding that we did the first year; but we sent out peremptory orders in the first instance. In making such orders, we picked out certain streets. We found it was not well to have the work done here and there all over the city, and so we took one street throughout as far as possible on one side at a time. We also endeavored to select those streets where improvements were contemplated in the public highways; and to that end we consulted

with the street department, and found out what streets were intended to be repaired or rebuilt or regraded. That was done for the purpose of causing as little inconvenience to the public as possible, and to prevent unnecessary tearing up of the streets.

Of course there were cases when, after a peremptory order, persons appeared and showed good reasons why they individually should not be obliged to conform to the order. We listened to those reasons; and, if they were satisfactory, the parties were excused for the time being, or their cases were continued until some future time, until, for instance, they should complete such changes in plumbing or make such alterations in their buildings as they might contemplate.

The season this year is hardly open; but we intend during the coming year — which we hope will not be one of such financial depression as the last — to compel everybody to connect his premises with the sewer who has not done so before. Already about two-thirds of the houses upon the line of the sewer are connected with it. The remaining third will be the hardest with which to compel connection. We shall encounter in that third all the kickers,— those who oppose the authority of the Board, and those who blaspheme against those sanitary regulations which have been so eloquently advocated this afternoon. Still, we hope to accomplish much; and I think our progress so far has not been too slow, under the difficulties we have had to meet. In Waltham we have put in about thirty-five miles of sewers; and it means a great deal to secure the connection with them of all the householders along that thirty-five miles. Nevertheless, in the progress of our work we have not had one case which we have been obliged to bring into court. The orders thus far have been complied with without serious opposition. Whether we shall be as free from opposition in the future as in the past we cannot tell; but I think we shall probably proceed to a successful termination of our labors.

DR. JESSE ROBBINS.— I should like to ask if there is any authority from the State to compel people to enter sewers, as regards Waltham?

MR. SMITH.— Not specifically as regards Waltham, but there is a general law which applies to all places where there is a public sewer.

DR. ROBBINS.— We found in Salem, when altering our ordinances, that it required an act of the legislature to compel any one to enter the sewer when there was a sewer passing through the street. The greatest difficulty we find there is that a great many people will petition the city government to lay a sewer; and, when it has been laid, they do not care to connect their sinks and cesspools with it.

MR. E. H. BROWER.— I think the Act of 1890, Section 1, requires that every building situated on any street or highway or lane through which there is a public sewer shall, when required by the Board of Health, be

connected therewith by a good and sufficient drain; and Section 2 imposes a penalty of $200 for neglecting to do so.

MR. WILLIAM H. GOVE.— Dr. Robbins is a little mistaken in his statement. There was a proposition in Salem, when we revised our ordinances, to put in a provision to require connection with the sewer in all cases; but it was not allowed to stand on the ground that this matter was within the jurisdiction of the Board of Health, not of the City Council. There is one difficulty we have to meet; and that is, while we can compel connection with the sewer, we cannot, where there is an old privy and it is not a nuisance, compel the privy to be connected. But the act referred to has been incorporated into our ordinances; and we have referred to it and acted upon it repeatedly, as I am sure the doctor will remember, if he considers a moment.

THE CHAIRMAN.— That is one of the defects which was permitted in the law which was made general in 1890. About ten years ago we obtained special legislation in Boston, in which we got permission to make persons enter the sewer where their premises abutted upon it, and under such circumstances they should not have a privy vault or cesspool, and that is a very important part of the act; but in many instances, as has been alluded to, you may make a party connect with the sewer, and he will connect something with the sewer, and leave his old vault or cesspool just as bad as before. And it seems to me that the law which was made general through the intervention of North Adams in 1890 should be amended again, so that we may get rid of those old vaults and cesspools. We made the first use of that law to get rid of these vaults in Boston, and succeeded in abolishing about eight thousand in that number of years. I think that is a very important defect in the law, and that it should be remedied.

DR. ROBBINS.— I stand corrected by my colleague. In Salem, the fact is, we are having a little row with a man whose vault is under another man's chamber window, and that man is connected with the sewer, and the offender says that we shall have to go to the legislature to compel him to connect. We had a physician in our city who said he was willing to risk his standing and reputation as a physician that a privy near a lying-in hospital was no nuisance. The Board thought differently. While the gentleman who maintained the nuisance was an intimate friend of mine, the Board compelled him to enter the sewer.

DR. RIPLEY.— I should like to ask Judge Smith if, in compelling people to make connections with the sewer, they compel them also to abolish their vaults and cesspools.

MR. SMITH.— We do not directly. Of course, in many instances where we have compelled the connection to be made, it has resulted in the abolition of cesspools and vaults. But we have felt the same defect in the

law and the same want of authority which has been pointed out by the Chairman, and we have only been able directly to abolish privy vaults and cesspools in those cases where they were nuisances. We have gone as far as we can go in that way, and we have accomplished a good deal. Still, we feel that additional legislation will be very desirable to compel a thorough change in the premises at the time connection is made with the sewer, wherever it may be necessary.

DR. ROBBINS.— I think the legislature should pass an act compelling every one to connect his privy vault and cesspool with the sewer.

MR. SMITH.— I should like to ask whether the city of Brockton lays any part of the particular drain to a man's premises.

DR. RIPLEY.— The city puts the drain to the inside of the wall of the house, at the expense of the owner.

PROFESSOR SEDGWICK.— I move that the thanks of this Association be extended to the Board of Health of the city of Brockton, to the Mayor, the Sewerage Commissioners, and the City Engineer, who so kindly extended the invitation to this body to visit them, who have entertained us so pleasantly while here, and who have afforded us the valuable opportunity of visiting their sewerage works and filters.

The motion was seconded and adopted.

The meeting was then adjourned.

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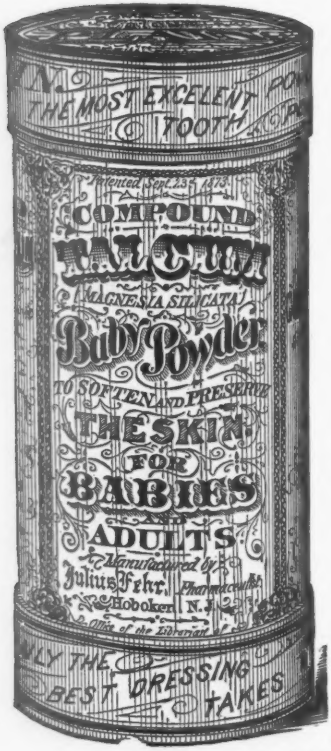

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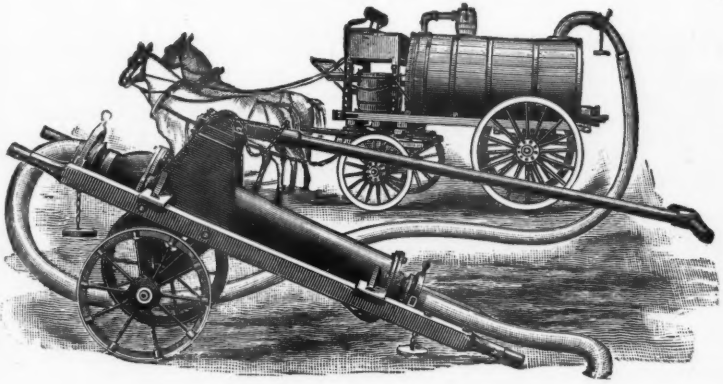

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Undertakes to EXTERMINATE INSECT VERMIN by means of its COLUMBIAN INSECTICIDE, a non-poisonous powder which is especially adapted for use in public buildings, it being safe, thorough, and swift in its operation. The Company employs competent workmen, and is ready to accept orders in any part of the State. *A building once cleaned is guaranteed free from vermin for six months to one year.*

Terms reasonable, and

NO PAY until

WATER BUGS, COCKROACHES, AND BEDBUGS

ARE EXTERMINATED.

The patronage of boards of health, of officers of hospitals, and of physicians in general is solicited. References to the following institutions, all of which have been recently cleaned by the use of the Columbian Insecticide: McLean Hospital, Somerville; House of Correction, Middlesex County; Carney Hospital; and Home for Incurables. Sample packages of the Columbian Insecticide are for sale at 50 cents by grocers and druggists, or may be procured at the office of the Company.

COLUMBIAN INSECTICIDE COMPANY,
277 Washington Street, Boston.

A Contagion-proof Coffin.

We desire to call the attention of physicians, and particularly of members of boards of health and officers of hospitals, to our new CONTAGION-PROOF METALLIC COFFIN.

The joints of the coffin are constructed on a new but exceedingly simple plan; two flexible flanges along the rim of the cover form a groove which fits upon the box; the groove is previously half filled with cement, and with a pair of rubber-covered pincers the outer flange is turned under, and encloses the rim of the box in such a manner as to seal the joint *hermetically*.

We have made the most careful tests, in the presence of physicians eminent in sanitary science, and have been able to prove to them that, AFTER THE COFFIN IS ONCE SEALED IN THIS WAY, IT IS IMPOSSIBLE FOR ANY CONTAGIOUS GERMS TO MAKE THEIR ESCAPE.

The value of such a coffin will be apparent to all who are aware of the present inconvenient precautions which must be taken in the burial of those who have died of contagious diseases. By using this coffin the funeral of such may be conducted publicly without the slightest danger to the health of the community.

The coffin is made of galvanized iron or steel, and SELLS FOR ABOUT A QUARTER OF THE PRICE OF THE USUAL METALLIC COFFIN. The customary mouldings of wooden caskets are followed in the metal, and the construction is such that the whole may be easily covered with cloth.

All interested are respectfully invited to call and examine.

LEWIS JONES & SON,

48 and 50 La Grange Street,

First street south of Boylston, leading from Tremont to Washington, adjoining Fourth Police Station,

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Carriages furnished for Funerals, Weddings, etc.

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The public are invited to call and examine this new model.

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ESTABLISHED 1865.

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THYMOLINE

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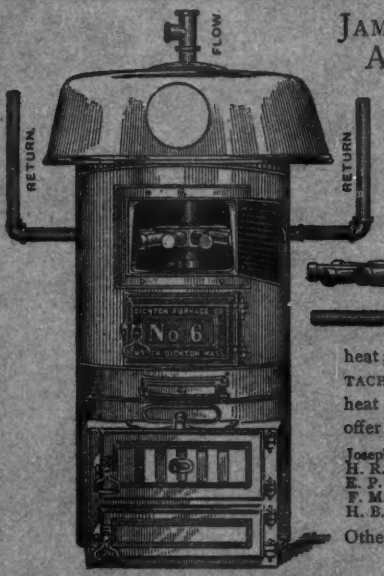

JAMAICA HOT WATER ATTACHMENT FOR FURNACES.

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"The great problems in mechanics are not so much to discover new forces as to reduce the wastage in present ones." Your present hot air furnace will generate sufficient heat; our JAMAICA HOT WATER ATTACHMENT added will distribute the heat where needed. In proof of this we offer these references:—

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Mellin's Food

How strong should Mellin's Food be made for an infant?

For infants under the age of three months or for delicate children take:

Mellin's Food	1 tablespoonful, heaping
Hot water	16 tablespoonfuls (one-half pint)
Fresh cow's milk	16 tablespoonfuls " "

Gradually increase the proportion of Mellin's Food and milk as the child grows, and for infants of six months and over, take:

Mellin's Food	2 tablespoonfuls, heaping
Hot water	8 tablespoonfuls (one-fourth pint)
Fresh cow's milk	24 tablespoonfuls (three-fourths pint)

Is this a suitable infant food?

Yes, it is the best artificial infant food, since it contains all the needed constituents for the perfect nourishment of the infant.

Should Mellin's Food ever be used with water alone?

Yes, but only as a temporary expedient in severe cases of infantile diarrhœa, in which cow's milk cannot be tolerated.

Should Mellin's Food be used with condensed milk?

Yes, but only as a temporary expedient, when it is impossible to obtain good fresh cow's milk.

A liberal sample bottle of Mellin's Food, sufficient for trial, will be sent free to any physician requesting it.

DOLIBER-GOODALE CO., BOSTON, MASS.